LATCH MECHANISM

The present invention relates to latch mechanisms for doors of vehicles. The invention further relates to vehicles including at least 2 doors, each door incorporating a latch mechanism.

It is known to provide latch mechanisms on doors of vehicles to allow opening and closing of the door. Such latch mechanisms have various modes or operation eg

a) Lock mode, wherein operation of an outside door handle does not open the latch mechanism

b) Superlocked mode, when in operation of an outside or an inside release lever does not operate the latch mechanism.

c) Child safety mode, wherein operation of an inside release lever does not operate the latch mechanism.

d) Release mode, wherein the latch mechanism is released via means other than operation of the inside or outside release levers.

Each mode has alternate states eg locked/unlocked, superlocked/not superlocked, child safety o/off and release/not released.

Typically each mode requires an individual mechanism to effect the alternative states, with operation of each mechanism being affected either manually or with an individual power actuator.

In the case of a latch mechanism operated entirely by power actuators, such as DC motors, it is also necessary to be able to open a locked door which has the child safety feature on in an emergency situation when actuation of the power actuators is not possible, such as when the keys to the vehicle are not available.

According
~~Thus according~~ to the present invention there is provided a latch mechanism including a housing, a pawl movably mounted in the housing to release the latch, with at least one of an inside and outside lock link mounted for movement with the pawl with the at least one lock link being movable between a first position at which operation of an associated release means causes movement of the pawl to release the

latch, and a second position at which the operation of the associated release means does not cause movement of the pawl.

Preferably movement of the at least on lock link between its first and second position is effected by a power actuator.

According to a further aspect of the invention there is also provided a latch mechanism having a set of operating modes, each mode having alternate states, the set including at least one of a lock mode and, a super lock mode, and at least one of a child safety mode and a release mode, changing of the latch mechanism between alternate states of each of the at least two modes of the set being effected by a single power actuator.

According to a further aspect of the invention there is provided a latch mechanism having a set of operating modes, each mode having alternate states, the set including a child safety mode and a release mode, changing of the latch mechanism between alternate states of each of the modes being effected by a single power actuator.

According to a further aspect of the invention there is provided a vehicle including a first and second door, each door including respective first and second latch mechanisms, the first and second latch mechanisms being substantially the same, and being operable by respective first and second power actuators to give respective first and second sets of operating modes each mode having alternate states, control of the power actuators being different to provide for different first and second sets of operating modes.

Brief Description of Drawings

The invention will now be described by way of example only with reference to the accompanying drawings in which;

Fig.1 is a latch mechanism according to the present invention in a super-locked condition;

Fig.1a is an enlarged view of part of Fig.1;

Fig.1b is a schematic view in the direction of arrow A of Fig.1;

Fig.2 is the latch mechanism of Fig.1 in a locked position with child safety on;

Fig.3 is the latch mechanism of Fig.1 in an unlocked condition with the child safety on;

Fig.4 is the latch mechanism of Fig.1 in a locked condition with the child safety off;

Fig.5 is the latch mechanism of Fig.1 in an unlocked position with the child safety off; and

Fig.6 is a latch mechanism of Fig.1 in a release position.

Detailed Description of Preferred Embodiment

With reference to Figs 1-6 there is shown a latch mechanism 10 including a body 11 which supports various components of the latch mechanism 10 as indicated below.

Latch mechanism 10 further includes a claw 12 pivotally mounted about axis 13 on the body 11. Claw 12 acts to secure an associated door (not shown) in a closed position via a striker pin 14 attached to the door aperture. Rotation of the claw 12 in an anticlockwise direction about axis 13 when viewing Fig.1 allows release of the striker pin 14, thus enabling opening of the associated door.

The claw 12 is held in a closed position by a pawl 15, only part of which is shown in dotted profile in Fig.1 for clarity. Pawl 15 is pivotally mounted on body 11 and can rotate about axis 16. Claw 12 can be held in a first safety position (not shown) when pawl 15 engages first safety abutment 17.

Pawl lifter 20 is generally flat and lies in a plane parallel to pawl 15, to which it is rotationally secured. When viewing Fig.1 pawl 15 is obscured by pawl lifter 20. Clearly, pawl lifter 20 also rotates about axis 16.

Viewing Fig. 1A

Inside lock link 21 and outside lock link 22 are mounted for movement with the pawl, in this case they are each individually pivoted about respective axes 21a and 22a on pawl lifter 20. In this case inside lock link 21 and outside lock link 22 are identical and each have respective cam followers 21b and 22b and release abutments 21c and 22c. Inside lock link 21 and outside lock link 22 are each biased in a clockwise direction when viewing Fig.1 such that the respective cam followers 21b and 22b contact cam 30.

Cam 30 is capable of rotating independently from pawl lifter 20 about axis 16. Cam 30 has three lobes 31, 32 and 33 and two levers 34 and 35 shown diagrammatically for clarity. Lobes 31, 32, 33 and levers 34 and 35 are all rotationally fast with cam 30. Preferably cam 30 can at least be rotated to the

various positions as described below by a power actuator (not shown) such as a DC motor or preferably a stepper motor.

Referring to Fig. 1 Outside release lever 40 is pivotedly mounted about axis 41. Inside release lever 43 (shown diagrammatically in Fig.1b) is pivotedly mounted about axis 44.

Operation of a door latch mechanism is as follows.

Fig.1 shows the door latch mechanism in a super lock condition, that is to say operation of the outside release lever 40 or inside release lever 43 does not allow unlatching of the mechanism. Referring to Figs. 1 and 1A In particular it can be seen that if outside release lever 40 were to be operated by being rotated in a clockwise direction about axis 41, abutment 42 would pass release abutment 22c of outside lock link 22 without contact (note that outside release lever 40 is in the same plane as outside lock link 22). Similarly inside release lever 43 when operated by being rotated in an anticlockwise direction about axis 44 when viewing Fig. 1B Fig.1b, would cause abutment 45 to pass release abutment 21c of inside lock link 21 (see especially Fig.1).

Fig.2 shows the door latch mechanism 10 in a locked position with the child safety feature on. It will be noted that cam 30 has been rotated 30 degrees in an anticlockwise direction when compared to Fig.1. However, the inside lock link 21 and outside lock link 22 are in the same position when compared with Fig.1 since neither of the cam followers 21b or 22b have, at this stage, ridden up any of the lobes 31, 32 or 33 of the cam 30 (see fig. 1A). However, lever 34 has been rotated to a position whereby operation of the inside release lever 43 in an anticlockwise direction when viewing Fig. 1B Fig.1b would cause abutment 46 to contact lever 34 and rotate cam 30 to the position shown in Fig.3. Note this initial operation of inside release lever 43 does not unlatch the mechanism but only operates to unlock the door (see below). This method of being able to override and open a locked door which has the child safety on is especially important in an emergency situation whereby a passer-by can effect access to the inside door handle (eg by breaking the door window glass), operate the inside door handle to unlock the door, then operate the outside door handle to open the door and then remove the child from the car.

Fig.3 shows the door latch mechanism 10 in an unlocked condition with the child safety feature on. In this case the cam 30 has been rotated sufficiently (either by operating the inside release lever when the cam was in the position shown in

Fig.2 or by independent rotation of the cam directly eg by a power actuator) such that cam follower 22b has ridden up cam lobe 32 resulting in anticlockwise rotation of outside lock link 22. Thus when outside release lever 40 is operated, abutment 42 (See Fig. 1) contacts release abutment 22c (See Fig. 1A) causing the pawl lifter 20 as a whole to rotate anticlockwise when viewing Fig.3 and releasing the pawl 15 and allowing the claw 12 to open. Stop 22d limits the anticlockwise rotation of outside lock link 22. Upon release of the outside release lever 40 the pawl lifter 20 (See Fig. 1) is biased back to the position as shown in Fig.3 by a spring (not shown). It should also be noted that the inside lock link 21 is in the same position as that shown in Fig.1, thus operation of the inside release lever 43 does not allow opening of the door.

Fig.4 shows the door latch mechanism 10 (See Fig. 3) in a locked condition with the child safety feature off. It should be noted that the cam 30 (See Fig. 3) has been rotated 90 degrees in an anticlockwise direction when compared with Fig.1. This results in cam follower 22b being situated between cam lobes 32 and 33 thus ensuring that operation of outside release lever 40 does not release the latch mechanism. (See Fig. 3) (See Fig. 1A) Furthermore, the rotation of the cam 30 has caused cam follower 21b to ride up cam lobe 31 causing inside lock link 21 to rotate anticlockwise about axis 21a. Thus abutment 21c of inside lock link 21 is contacted by abutment 45 (See Fig. 1B) of inside release lever 43 (See Fig. 2) when it is operated. This referring to Fig. 1A causes anticlockwise rotation of the pall lifter 20 about axis 16 resulting in unlatching or the door mechanism and allowing the door to be subsequently opened. Stop 21d limits the anticlockwise rotation of inside lock link 21. It should be noted that the operation of the (See Fig. 1B) inside release lever 43 also causes abutment 46 (See Fig. 1B) (See Fig. 1A) to contact lever 35 (See Fig. 1A) causing rotation of cam 30 to the position shown in Fig.5. This prevents a vehicle occupant inadvertently locking himself out of the vehicle since opening of the door from the inside automatically unlocks the door, allowing subsequent opening from the outside.

Fig.5 shows the door latch mechanism 10 (See Fig. 5) in an unlocked position with the child safety feature off. It can be seen that the cam has been rotated (either by operating the inside release lever when the cam was in the position shown in Fig.4 or by independent rotation of the cam directly eg by a power actuator) such that abutment 22b now rests on lobe 33 allowing operation of the outside release lever 40 to unlatch the latch mechanism as described above. Furthermore abutment 21b

remains in contact with lobe 31 thus ensuring that operation of the inside release lever also unlatches the door mechanism.

Fig.6 shows the door latch mechanism 10 in a released position. This is achieved by rotation of cam 30 in an anticlockwise direction which allows contact between corresponding lost motion abutments (not shown) on the pawl lifter 20 and cam 30. Such lost motion abutments allow the cam 30 to rotate the pawl lifter 20 to release the door latch mechanism independently of the operation of the outside release lever 40 or the inside release lever 43.

Note that only a single cam is required to effect the various modes of operation.

In further embodiments the inside and outside lock links can be mounted directly on the pawl.